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Cover: *Anthrax maculata* (Diptera: Bombyliidae) described by Macquart in 1846 has been collected commonly throughout eastern Australia, in the northern third of N.T., and in the Kimberly Region and south-western W.A. Specimens have been collected flying around burnt trees and mud wasp nests. Females are a common sight in suburban Brisbane, patrolling brick walls searching for mud wasp nests. Illustration by Chris Lambkin, Department of Entomology, University of Queensland.

OBSERVATIONS ON THE ECLOSION OF THE HAIRY CICADA *TETTIGARCTA CRINITA* DISTANT (HOMOPTERA: CICADOIDEA: TETTIGARCTIDAE)

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Abstract

The eclosion of *Tettigarcta crinita* Distant is documented and figured from observations made at Kosciusko National Park, NSW, Australia. Peculiarities of the eclosion are noted and compared with the eclosion of Cicadidae.

Introduction

The hairy cicada, *Tettigarcta crinita* Distant, is one of two extant species that make up the family Tettigarctidae. All other species of Tettigarctidae are known only from fossil records. The Tettigarctidae possess a number of morphological features that clearly distinguish them from all other cicadas (Evans 1941, Moulds 1990).

In this paper we document the eclosion of *T. crinita* and discuss differences from the eclosion of other cicadas (family Cicadidae, *sensu* Hayashi 1984, Moulds 1990). Although aspects of the eclosion of *T. crinita* have been previously recorded (Ashton 1924, McKeown 1951, Moulds 1990), details have been lacking, making comparison of the eclosion processes impossible.

Our observations were made on 15 February 1997, near Rules Point (*ca* 1300 m altitude) at the junction of the exit road from the Yarrangobilly Caves and the Snowy Mountains Highway, Kosciusko National Park, NSW. A male final instar nymph was found climbing on the trunk (*ca* 10 cm dbh) of a snow gum, *Eucalyptus pauciflora*, at about 1.5 m above the ground. The nymph was transferred to a low shrub for ease of observation.

Observations

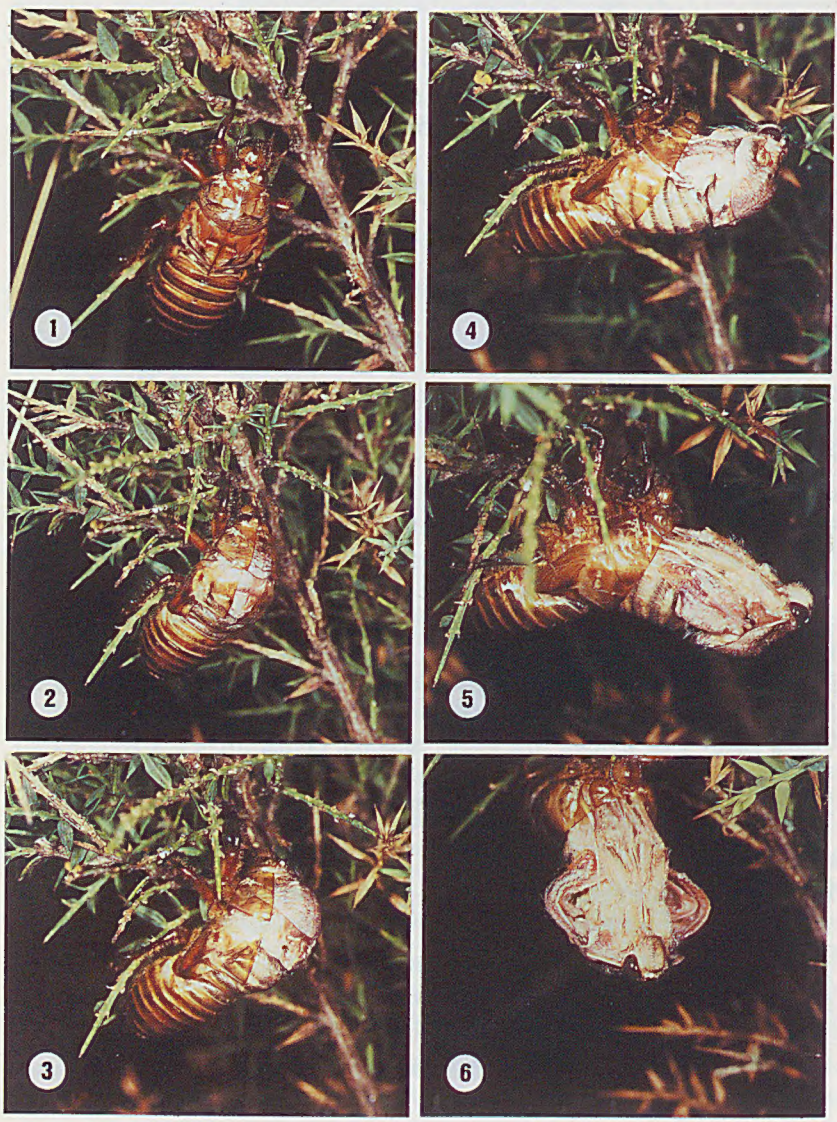
19:00h Eastern Standard Time (Fig. 1) – Just after dusk the nymph ceased moving after having placed its legs tightly around a twig in preparation for eclosion.

19:23h (Fig. 2) – After several attempts to hump the dorsum, the vertex and thoracic nota began to split along the dorsal mid-line.

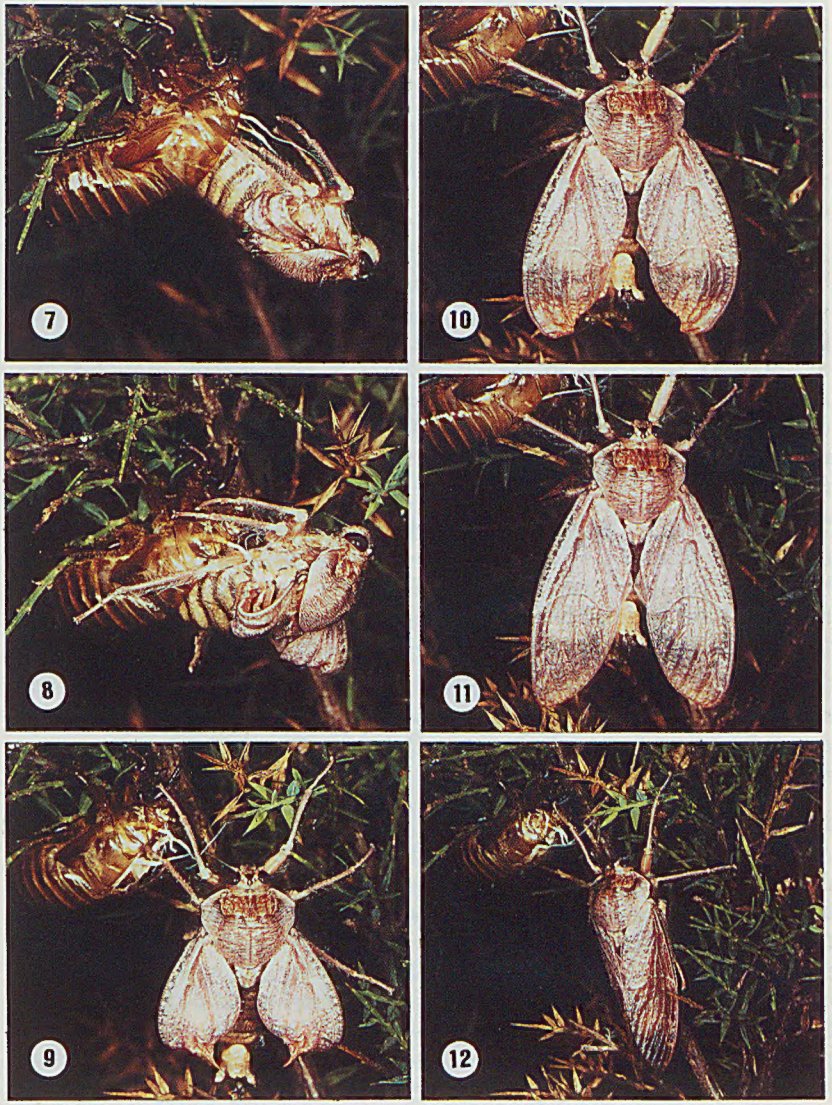
19:27h (Fig. 3) – Mesonotum, including scutellum, now largely exposed behind pronotum (to be covered later by the pronotum).

19:33h (Fig. 4) – Head freed. Body of the emerging adult is at this stage pale testaceous with the pronotal callus darkened.

19:42h (Fig. 5) – Fore and hind wings freed from exuviae, curling inside, and the forewing much wrinkled. Posterior plate of pronotum gradually expanded posteriad, now overlying much of mesonotum.



Figs 1-6. Eclosion of *Tettigarcta crinita* (at Yarrangobilly, Kosciusko Mts., NSW, on 15 February 1997; photos M. Hayashi).



Figs 7-12. Eclosion of *Tettigarcta crinita*, continued.

19:48h (Figs 6-7) – All legs have become free from the exuviae; wings now slightly lengthened. Mesonotum now largely concealed by the posterior dilation of pronotum, leaving only the scutellum visible; the typical *Tettigarcta* form of thoracic nota has now been completed. During this stage,

the body hangs backwards and downwards with the distal part of abdomen remaining within the exuviae. In this condition the adult remains immobile, a behaviour similar to that found in species throughout the Cicadidae.

20:10h (Fig. 8) – The body is now abruptly raised and the fore and mid legs grasp the head and pronotum of the exuviae. At this point, the teneral adult again rests without action for around 10 min. In contrast, emerging adults of Cicadidae take no rest at this stage.

20:18h (Figs 9-10) – The pilose abdomen is entirely pulled free of the exuviae and the adult clings by its fore and mid legs onto the exuviae or nearby twigs. A pair of genital styles (or harpagones) are now clearly visible, cudgel-like, densely pilose and protruding divergent. The basal half of forewing (proximal to the nodal line) is now mostly extended, thus forming a triangular shape. The distal part of forewing remains small and crumpled, as an orange-coloured knob-like process. Only after the entire extension of forewing basal to the nodal line, does the apical portion begin to extend.

20:28h (Fig. 11) – Wings have completely extended but continue to hang limp. The forewing is translucent and entirely pale testaceous while the hindwing is somewhat smoky. Forewing appears semi-glossy and heterogeneous (similar to the forewing of Heteroptera), coriaceous before nodal line and membranous beyond.

20:47h (Fig. 12) – Wings are folded tectiform above the dorsum. The emergence is now complete. Total time taken for emergence is approximately 1 hr 24 min from the splitting of the mid-dorsal line of the nymphal skin.

Discussion

Although the species of Tettigarctidae show several morphological differences from Cicadidae, the manner and process of the eclosion as observed in *Tettigarcta crinita* are broadly similar. However, we recognise two notable differences. Firstly, the eclosion of *T. crinita* differs in the 10-minute pause prior to the complete release of the abdomen. This has not been observed in Cicadidae and may be characteristic of the Tettigarctidae. Secondly, unlike the Cicadidae in which the forewing, as a whole, is gradually extended from its base to the apex (Snodgrass 1921, Kato 1956, Moulds 1990, Boulard and Mondon 1995), that of *T. crinita* has two distinct steps in its forewing extension. There is complete expansion of the basal half, before expansion of the apical half. We have not observed such a development among other Auchenorrhyncha and it may be unique to the Tettigarctidae.

Further we note that the forewing of *T. crinita*, just after full extension, is clearly heterogeneous, divided by the nodal line, coriaceous basad and membranous apicad. Evans (1941) suggested that this hemelytral condition

and well-defined nodal line have evolved parallel to a similar condition in the Heteroptera.

References

ASHTON, H. 1924. Notes on the "hairy cicada" (*Tettigarcta crinita*). *Proceedings of the Royal Society of Victoria* (n. s.) **36**: 238-239.

BOULARD, M. and MONDON, B. 1995. *Vies & mémoires de cigales, Provence-Languedoc méditerranée*. Éditons de l'Équinoxe, Barbentane, France; 159pp, cd.

EVANS, J.W. 1941. The morphology of *Tettigarcta tomentosa* White (Homoptera, Cicadidae). *Papers and Proceedings of the Royal Society of Tasmania* **1940**: 35-49.

HAYASHI, M. 1984. A review of the Japanese Cicadidae. *Cicada (Transactions of the Japan Cicada Club)* **5**: 25-75.

KATO, M. 1956. *The biology of the cicadas*. Iwasaki Shoten, Tokyo; 10+319pp, 46pls.

McKEOWN, K.C. 1951. Field notes on some insects of the Mount Kosciusko area. *Australian Zoologist* **11**: 333-337, pl. XLII.

MOULDS, M.S. 1990. *Australian cicadas*. New South Wales University Press, Kensington, NSW; 6+217pp, 24pls.

SNODGRASS, R.E. 1921. The seventeen-year locust. *Annual Report of the Smithsonian Institution* **1919**: 381-409, pls. 1-5.

AN ACCUMULATIVE BIBLIOGRAPHY OF AUSTRALIAN ENTOMOLOGY

Compiled by G. Daniels

ABBOTT, I.

1993 Review of the ecology and control of the introduced bark beetle *Ips grandicollis* (Eichhoff) (Coleoptera: Scolytidae) in Western Australia, 1952-1990. *CALMSci.* **1:** 35-46.

ACHTERBERG, C. van

1995 Generic revision of the subfamily Betylobraconinae (Hymenoptera: Braconidae) and other groups with modified fore tarsus. *Zool. Verh. (Leiden)* **298:** 1-242.

AMORIM, D.S. and TOZONI, S.H.S.

1994 Phylogenetic and biogeographic analysis of the Anisopodoidea (Diptera, Bibionomorpha), with an area cladogram for intercontinental relationships. *Revta bras. Ent.* **38:** 517-543.

ANDERSEN, N.M. and WEIR, T.A.

1997 The gerrine water striders of Australia (Hemiptera: Gerridae): taxonomy, distribution and ecology. *Invert. Taxon.* **11:** 203-209.

AUSTIN, A.D. and DANGERFIELD, P.C.

1997 A new species of *Jarra* Marsh and Austin (Hymenoptera: Braconidae) with comments on other parasitoids associated with the eucalypt longicorn *Phoracantha semipunctata* (F.) (Coleoptera: Cerambycidae). *Aust. J. Ent.* **36:** 327-331.

AUSTIN, A.D. and FIELD, S.A.

1997 The ovipositor system of scelionid and platygastrid wasps (Hymenoptera: Platygastroidea): comparative morphology and phylogenetic implications. *Invert. Taxon.* **11:** 1-87.

AUSTIN, A.D., QUICKE, D.L.J. and MARSH, P.M.

1994 The hymenopterous parasitoids of eucalypt longicorn beetles, *Phoracantha* spp. (Coleoptera: Cerambycidae) in Australia. *Bull. ent. Res.* **84:** 145-174.

BEALE, J.P.

1998 Comment on the efficacy of Queensland nature conservation legislation in relation to *Acrodipsas illidgei* (Waterhouse and Lyell) (Lepidoptera: Lycaenidae: Theclinae). *Pacif. Conserv. Biol.* **3:** 392-396.

1998 Temporal and spatial distribution of the rare, myrmecophagous Illidge's ant-blue butterfly, *Acrodipsas illidgei* (Lycaenidae). *J. Lepid. Soc.* **52:** 139-150.

BELLAMY, C.L.

1997 Phylogenetic relationships of *Xyroscelis* (Coleoptera: Buprestidae). *Invert. Taxon.* **11:** 569-574.

1997 A clarification of authorship of buprestid genera originally defined in the catalogues of P.F.M.A. Dejean (Coleoptera, Buprestidae). *Fragm. ent.* **29:** 365-382.

BELVEDERE, M., BAIN, G. and STELLER, P.

1998 Sword-grass brown butterfly project. *Victorian Nat.* **115:** 142-145.

BRABY, M.F.

1998 Notes on the biology of some Hesperiidae and Lycaenidae (Lepidoptera) in south-eastern Australia. *Victorian Nat.* **115:** 4-8.

BRABY, M.F., ATKINS, A.F., DUNN, K.L., WOODGER, T.A. and QUICK, W.N.B.

1997 A provisional list of common names for Australian butterflies. *Aust. J. Ent.* **36:** 197-212.

BRAILOVSKY, H.

1997 First record of the tribe Hydarini in Australia with the description of a new species of *Hydarella* Bergroth (Hemiptera: Coreidae). *Aust. J. Ent.* **36:** 225-228.

BRAILOVSKY, H. and MONTEITH, G.B.

1998 A new genus of Amorbini (Heteroptera: Coreidae) from Australia, with two new species. *Mem. Qd Mus.* **42:** 379-385.

BROWN, G.R.

1998 The "scolioid" aculeate Hymenoptera (Mutillidae, Scoliidae and Tiphiidae) of Musselbrook Reserve. Pp. 47-57 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report.* Royal Geographical Society of Queensland: Brisbane.

BROWN, G.R. and THEISCHINGER, G.

1998 *Huonia melvillensis* spec. nov., a new dragonfly from Australia (Anisoptera: Libellulidae). *Odonatologica* **27:** 99-103.

CHISHTI, M.J.K. and QUICKE, D.L.J.

1994 Revision of the Indo-Australian parasitic wasp genus *Macrobracon* with the description of two new species (Hymenoptera: Braconidae). *Zool. J. Linn. Soc.* **111:** 265-296.

1996 A revision of the Indo-Australian species of *Stenobracon* (Hymenoptera: Braconidae) parasitoids of lepidopterous stem borers of graminaceous crops. *Bull. ent. Res.* **86:** 227-245.

COLLESS, D.H.

1998 Morphometrics in the genus *Amenia* and revisionary notes on the Australian Ameniinae (Diptera: Calliphoridae), with the description of eight new species. *Rec. Aust. Mus.* **50:** 85-123.

CRANSTON, P.S.

1997 Revision of Australian *Rheotanytarsus* Thienemann & Bause (Diptera: Chironomidae), with emphasis on immature stages. *Invert. Taxon.* **11:** 705-734.

1998 The Chironomidae (Diptera) of the Musselbrook region. Pp. 59-66 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report.* Royal Geographical Society of Queensland: Brisbane.

1998 The Australian species of *Neozavrelia* Goetghebuer (Diptera: Chironomidae: Tanytarsini). *Aust. J. Ent.* **37:** 107-112.

CRANSTON, P.S. and HARDWICK, R.A.

1996 The immature stages and phylogeny of *Imparipecten* Freeman, an Australian endemic genus of wood-mining chironomid (Diptera). *Aquatic Ins.* **18:** 193-207.

A NEW GENUS AND SPECIES OF FLIGHTLESS CARABIDAE (COLEOPTERA) FROM FIJI

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Abstract

Vitagonum apterum gen. et sp. nov. is described from the island of Viti Levu, Fiji and is considered to represent a flightless relict of an ancient carabid fauna, now largely displaced by more modern, winged elements or their recent derivatives.

Introduction

During the compilation of a checklist of the carabid beetles known from the Fijian archipelago, which currently stands at 65 species (Moore, unpublished), it has become apparent that lightly built, fully winged and highly mobile species are dominant, indicating a predominantly recent fauna. However, one heavily sclerotised, flightless species, apparently confined to the main island of Viti Levu, is an obvious exception and is believed to represent a relict of an ancient fauna. This species, which is placed in the tribe Platynini and which shows some relationships with other Pacific island relicts of the tribe, is described below.

Vitagonum gen. nov.

(Figs 1-5)

Type species: *Vitagonum apterum* sp. nov.

A flightless genus of Platynini, with the following character states.

Head with one supraorbital seta beside each eye; palpi slender, glabrous; mentum (Fig. 2) broadly toothed and with 2 deep paramedian pits; antennae long, with 3 basal segments glabrous. Pronotum without marginal setae; prosternal process between coxae not very prominent but narrowly compressed and carinate, asetose. Elytra soldered along suture, with apices spinose; no discal pores; metepisterna elongate; hindwings reduced to a costal vein; legs long; tarsi slender, with the fourth segment weakly emarginate, scarcely bilobed; claws simple; protibiae with a well developed cleaning organ; male anterior tarsi scarcely dilatate, but 3 basal segments biseriately squamose beneath. Aedeagus (Fig. 3) slender, well sclerotised; parameres conchoid, the left reduced; female stylomeres (Figs 4-5) short, stylomere-1 with a few fine setae, stylomere-2 with one stout spine on latero-basal surface (= ventral enciform seta).

The correct tribal placement of this new genus is not entirely clear, although most of its character states are in accord with those of the Platynini (= Agonini). Such states include the loss of supraorbital and pronotal marginal setae [which are frequent in flightless platynine stocks, notably in New Guinea (Darlington 1952)], the spinose elytral apices, the small, conchoid parameres and the presence of setae on stylomere-1 of the female

genitalia. However, the rather heavy build and, in particular, the compressed and carinate prosternal process, are more suggestive of the Sphodrini.

Valentine (1987) commented on the intermediate position of certain 'agonosphodrines', including his new genus *Bryanites,* with two species in Samoa, and he placed this genus, along with *Prosphodrus* Britton (1959) of New Zealand and *Mexisphodrus* Barr (1965) of Mexico, in his new tribe Prosphodrini, defined by the presence of a keeled prosternal process, in combination with conchoid parameres. However, and although he was unaware of *Bryanites*, Casale (1988), in his general revision of part of the Sphodrini, excluded *Prosphodrus* and *Mexisphodrus* from this tribe and confidently placed them in the Platynini, on the basis of their male and female genitalic characters. Meanwhile, Barr (1981) had also transferred his *Mexisphodrus* from the Sphodrini to the Platynini.

I have not had an opportunity to study material of any of the genera included in Valentine's 'Prosphodrini', but it is clear from published figures that they include very generalised carabids that, apart from loss of wings, show little of the secondary adaptation apparent in *Vitagonum*. Moreover, since the validity of the Prosphodrini is perhaps still open to question, I prefer to retain *Vitagonum* as a platynine genus. However, in view of these uncertainties and the currently poorly understood internal relationships of the Platynini, it is scarcely possible to indicate a precise position for the new genus within this tribe.

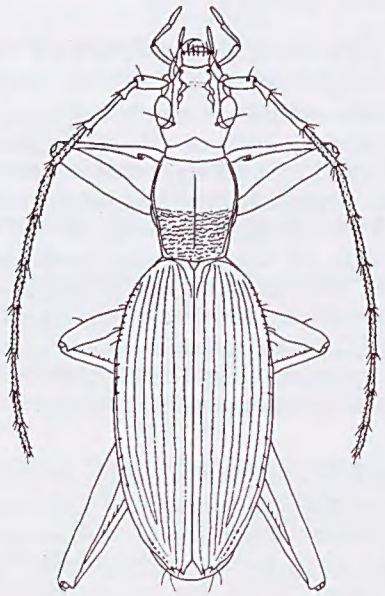
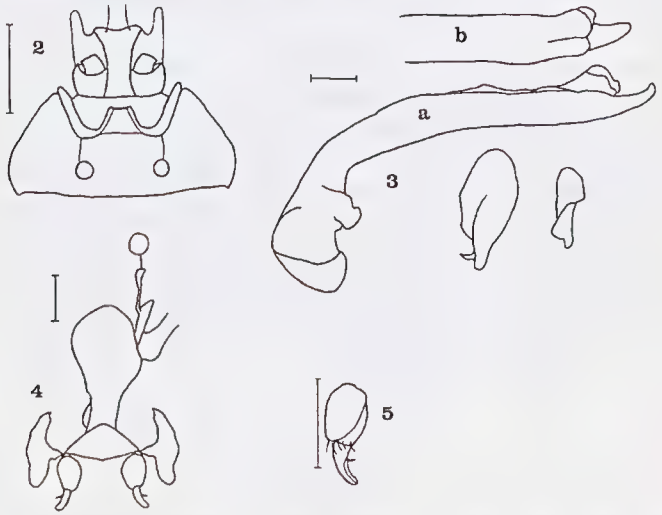


Fig. 1. *Vitagonum apterum* gen. et sp. nov., paratype male; natural length = 15 mm.

Vitagonum apterum sp. nov.
(Figs 1- 5)

Types. Holotype ♂, FIJI, VITI LEVU: Nadarivatu, 1000 m, under log, 17.ix.1938, Y. Kondo (Bernice P. Bishop Museum [BPBM], Honolulu). *Paratypes*: 9 ♂, 5 ♀, same data as holotype (BPBM; B. P. Moore Collection (CM), Canberra); 10 ♂, 8 ♀, Nadarivatu, Yoo Microwave Station, 1100 m, 16-23.viii.1978, S. & J. Peck (S. & J. Peck Collection, Ottawa; CM); one ♂, Nadarivatu, 25.ix.1950, B. A. O'Connor (Department of Agriculture Collection, Koronivia Research Station, Suva).

Description. Elongate, slender; largely dull black but femora, tarsi and antennomeres 2-11 piceous. Head elongate; neck pronounced; mandibles moderately long, acutely pointed; eyes moderately large and prominent; genae oblique; labrum transverse, 6-setose; tooth of mentum slightly bifid; frontal furrows broad, shallow,subparallel; antennae slender, reaching hind third of elytra in repose;. Pronotum fusiform, margined at sides, coarsely rugose in basal half; anterior angles closely applied to head; posterior angles rounded, not prominent. Elytra elongate-oval, fully striate; striae lightly crenulate; apices shortly dehiscent, bispinose. Abdomen smooth, segments 3-6 with 2 prominent setae about midline in male, terminal segment 4-setose in female; onychium sparsely setose beneath; median lobe of aedagus prominently recurved at apex (Fig. 3); no distinct armature in the internal sac. Length 13.5-14.5 mm; max. width 4.4-4.7 mm.



Figs 2-5. *Vitagonum apterum* gen. et sp. nov. (2), mentum and ligula; (3), aedeagus, (a), left lateral, with parameres detached, (b), dorsal; (4), female genitalia, ventral; (5), female right stylus, ventral, enlarged. Scale lines = 0.5 mm.

Comments. The type locality of Nadarivatu lies 15 km south of the central north coast of Viti Levu. Two specimens from 70 km south of Nadarivatu and 10 km north of the south coast (1 ♂, 1 ♀, not types, 10 km north of Galoa, 29.viii-1.ix.1978, S. & J. Peck, col. Peck), are a little smaller (length 12 mm) than those of the type series and of less slender build. The pronotum, in these specimens, is of a more lozenge-like shape (i.e. without the lateral sinuations of the type form), the elytra are more ovoid (especially in the female) and are more markedly punctato-striate, and the legs and antennae are shorter. The aedeagus of the male is even more slender than that of the holotype but otherwise of similar form.

These differences, even if sustained in larger series, can scarcely indicate anything more than local variation within a single species. However, in view of this evident variation, a single female from Colo North, Mt Victoria, 10.ix.1938, Y. Kondo (BPBM) has been excluded from the type series. Although it was evidently collected close to the type locality, it cannot be separated, morphologically, from the nomino-typical form.

Acknowledgments

I am indebted to Dr S.B. Peck (Carlton University, Ottawa), Dr G.A. Samuelson (BPBM) and Mr S.R. Singh (Department of Agriculture, Koronivia, Suva) for the loan and gift of type material.

References

BARR, T.C., Jr. 1965. A new cavernicolous sphodrine from Veracruz, Mexico. *Coleopterists Bulletin* **19**: 65-72.

BARR, T.C., Jr. 1981. The cavernicolous anchomenine beetles of Mexico. *Association for Mexican Cave Studies Bulletin* **8**: 161-192.

BRITTON, E.B. 1959. Carabidae (Coleoptera) from New Zealand caves. *Proceedings of the Royal Entomological Society of London* **28**: 103-106.

CASALE, A. 1988. Revisione degli Sphodrina (Coleoptera, Carabidae, Sphodrini). *Museo regionale di Scienze Naturali di Torino*, Monographie V, pp 1024.

DARLINGTON, P.J., Jr. 1952. The carabid beetles of New Guinea. Part 2. *Bulletin of the Museum of comparative Zoology, Harvard College* **107**(3): 89-252, 4pls.

VALENTINE, J.M. 1987. Some ancient and zoogeographically significant carabid beetles from the South Pacific (Coleoptera: Carabidae), with descriptions of new taxa. *Bishop Museum Occasional Papers* **27**: 73-89.

THE BUTTERFLIES (LEPIDOPTERA) OF EAST AND WEST WALLABI ISLANDS, WESTERN AUSTRALIA

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Abstract

Nine species of butterfly are recorded from East and West Wallabi Islands in the Houtman Abrolhos, Western Australia. Seven of these, *Trapezites argenteoornatus insula* (Waterhouse), *Belenois java teutonia* (Fabricius), *Danaus chrysippus petilia* (Stoll), *Vanessa itea* (Fabricius), *Junonia villida calybe* (Godart), *Theclinesthes serpentata serpentata* (Herrich-Schäffer) and *Zizina labradus labradus* (Godart), are recorded from West Wallabi I. Five species, *T. a. insula, D. c. petilia, Vanessa kershawi* (McCoy), *T. s. serpentata* and *Neolucia agricola occidens* Waterhouse & Lyell, are recorded from East Wallabi I. Their status on the islands is discussed.

Introduction

The islands of the Houtman Abrolhos are located between 60 and 80 km off the mid-west coast of Western Australia, west of Geraldton. They are divided into four distinct groups: the isolated North Island; the Wallabi group; the Easter group; and the Pelsaert group. In October 1997 we visited the two largest islands in the archipelago, West Wallabi I. (28°27'S, 113°42'E) and East Wallabi I. (28°26'S, 113°44'E), to survey the lepidopteran fauna. Prior to our visit the only butterfly recorded from the islands was the Silver-spotted Skipper, *Trapezites argenteoornatus insula* (Waterhouse) (Common and Waterhouse 1981, Dunn and Dunn 1991).

East Wallabi I. lies little more than a kilometre to the north-east of West Wallabi I. Both islands are low and flat, their highest points being 15 m. They are physiographically very similar in that both have large areas of exposed pavement limestone, as well as consolidated and unconsolidated dunes. West Wallabi alone though has extensive areas of shell grit and guano-rich soils where shearwaters nest. The saltbush *Atriplex paludosa* (Chenopodiaceae) is dominant in these areas (Storr 1965). There are no shearwater colonies on East Wallabi, where the beds of shell grit are much less extensive. Although East Wallabi (330 ha) is smaller than West Wallabi (619 ha), its vegetation is more diverse; Storr (1965) has pointed out that this can only be due to the presence of guano on West Wallabi I. The mean average rainfall for the Abrolhos is about 300 to 400 mm, most of it falling from May to September (Storr *et al.* 1986).

Methods

Both West and East Wallabi Is were surveyed over a three-day period from 5-7 October 1997. Throughout this time the weather was warm and sunny, with only light patchy cloud. Winds were at first north-easterly, later turning south-westerly. Prior to our arrival, strong off-shore easterlies had predominated.

Extensive searches were conducted across both islands and each of the major habitat types was carefully explored. Hilltops and dune ridges were checked for hill-topping butterflies. Known butterfly foodplants were examined for signs of larval activity. Botanical nomenclature follows Green (1985).

Results

The results of our survey are summarised in Table 1. Voucher specimens are lodged in the Insect Collection of the Department of Conservation and Land Management, Perth WA.

Table 1. Butterflies recorded from West Wallabi and East Wallabi Islands.

FAMILY	SPECIES	WEST WALLABI	EAST WALLABI
Hesperiidae	*Trapezites argenteoornatus insula*	•*	•
Pieridae	*Belenois java teutonia*	•*	
Nymphalidae	*Danaus chrysippus petilia*	•*	•*
	Vanessa kershawi		•*
	V. itea	•*	?°
	Junonia villida calybe	•*	
Lycaenidae	*Neolucia agricola occidens*		•*
	Theclinesthes s. serpentata	•*	•*
	Zizina l. labradus	•*	
TOTALS	9	7	5

Note:- * = new record; ° = signs of larvae, but no adults or larvae seen.

Records for West Wallabi Island

HESPERIIDAE

Trapezites argenteoornatus insula (Waterhouse).

Although widespread, this species was generally uncommon on the island. Six specimens were collected, all in the vicinity of the foodplant *Acanthocarpus preissii* (Dasypogonaceae), growing on the limestone pavement. Three hatched pupal cases were located in typical shelters on the foodplant.

PIERIDAE

Belenois java teutonia (Fabricius)

This species was observed (but not collected) on a number of occasions. Individuals were most often seen flying across the island or circling around prominent *Pittosporum phylliraeoides* and *Myoporum insulare* shrubs.

NYMPHALIDAE

Danaus chrysippus petilia (Stoll)

D. c. petilia was uncommon, with individuals seen on only four occasions. One specimen was taken on top of the highest consolidated dune, at Eagle Point, near the south-western corner of the island.

Vanessa itea (Fabricius)
No adults were encountered. However, numerous larval shelters on nettles (*Urtica urens*: Urticaceae) growing in sheltered sites under large *Pittosporum phylliraeoides* shrubs indicated recent activity. Two mid-stage larvae were collected and reared to adults. Another foodplant, the annual *Parietaria debilis* (Urticaceae) (Powell 1993), is recorded from this and other islands in the Abrolhos. We could find only a few poorly developed plants, on the limestone pavement; these did not show any signs of use by *V. itea* larvae.

Junonia villida calybe (Godart).
This species appeared to be very uncommon on the island, with only one specimen seen, on flat limestone pavement on the eastern side of the island. It was not collected.

LYCAENIDAE
Theclinesthes serpentata serpentata (Herrich-Schäffer)
This species was particularly common in low-lying *Atriplex paludosa* saltbush areas in the northern part of the island, east of Pelican Point.

Zizina labradus labradus (Godart)
Two specimens were obtained, both flying behind the unconsolidated beach dunes at Pelican Point on the western side of the island.

Records for East Wallabi Island
HESPERIIDAE
Trapezites argenteoornatus insula (Waterhouse).
This skipper was very common on the peninsula, particularly on the northern shoreline opposite Turtle Bay, where the foodplant *Acanthocarpus preissii* was abundant. Individuals were observed feeding at the flowers of *Scaevola crassifolia* (Goodeniaceae) and *Westringia dampieri* (Lamiaceae).

NYMPHALIDAE
Danaus chrysippus petilia (Stoll)
No specimens were obtained, but one butterfly was seen flying over dense low heathland near the centre of the island.

Vanessa kershawi (McCoy)
Only one individual was encountered, captured feeding on the flowers of *Scaevola crassifolia* on the peninsula near Fish Point.

Vanessa itea (Fabricius)
No adults or larvae were seen. However, some nettles (*Urtica urens*) near Fish Point were stripped of some of their leaves, suggesting the presence of larvae. The other foodplant, *Parietaria debilis*, is also recorded from this island (Storr 1965) but no specimens were found.

LYCAENIDAE

Theclinesthes serpentata serpentata (Herrich-Schäffer).
T. s. serpentata was fairly common on the southern side of the island, particularly near the airstrip.

Neolucia agricola occidens Waterhouse and Lyell.
This species was found mainly near Eagle Hill, on the south-eastern side of the island. Adults congregated around small and very compact *Bossiaea spinescens* (Papilionaceae) shrubs (previously *Bossiaea rufa* var. *foliosa*; Storr 1965). These shrubs were most numerous along the narrow ecotone between the consolidated dunes and the pavement limestone.

Discussion

The breeding of two species on the islands was confirmed by the finding of hatched pupal cases of *T. a. insula* and larvae of *V. itea*. The breeding of a further two species is strongly implied. On West Wallabi I., *T. s. serpentata* congregated around a likely foodplant, *Atriplex paludosa*. On East Wallabi I., *N. a. occidens* was habitually seen around *Bossiaea spinescens* shrubs. In Queensland larvae of *N. a. agricola* feed on *Bossiaea carinalis* (Common and Waterhouse 1981) and *Bossiaea rhombifolia* (Monteith and Yeates 1988).

No evidence of breeding was observed for any of the remaining species. However, there is a strong possibility that *B. j. teutonia* may do so, since one of its known foodplants, *Capparis spinosa* (Capparaceae) (Common and Waterhouse 1981), occurs on East and West Wallabi Is (Storr 1965). Even though *J. v. calybe* was observed only once, *Plantago varia* (Plantaginaceae) is a likely foodplant on the islands. For *D. c. petilia* and *V. kershawi* the position is more doubtful. No known foodplant of these species occurs on either of the Wallabi islands but plant species belonging to the foodplant families of both do occur.

The final species, *Z. l. labradus*, is of particular interest. On West Wallabi I., where we collected it, no native plant species in either of its known foodplant families, Fabaceae and Mimosaceae, is recorded. Collected specimens may have travelled from nearby East Wallabi I., where plant species in both the Fabaceae and the Mimosaceae occur.

An ability to travel between the Abrolhos Islands and the mainland will allow the presence on the islands of species that cannot maintain permanent populations there. Mobile butterfly species are able to cross stretches of ocean of much greater extent than the 60-80 km between the Abrolhos Islands and the mainland (Gibbs 1980). Of the nine species we recorded on the Abrolhos, five are known to be highly mobile. *B. j. teutonia*, *V. kershawi*, *V. itea* and *J. v. calybe* are migratory (Common and Waterhouse 1981). *D. c. petilia*, although less known as a migratory species, clearly has

the ability to travel long distances. Common and Waterhouse (1981) note that it has been taken in Tasmania, where it is not established. Bruce Ayling (pers. comm.) has reported seeing *D. c. petilia* on the Abrolhos on occasions after periods of easterly winds. Easterly winds had been blowing prior to our arrival on the islands and might have accounted for our recording this and other mobile species.

We surmise that *T. a. insula*, *N. a. occidens* and *T. s. serpentata* are permanent residents on the Abrolhos, where they breed and maintain stable populations, whereas the occurrence of *B. j. teutonia*, *D. c. petilia*, *V. kershawi*, *V. itea* and *J. v. calybe* is probably dependent on at least some degree of transit from the mainland. Even though *V. itea* breeds on the Abrolhos, it is unlikely to persist there in summer and autumn, when its annual foodplants are not available. Here, as on the adjacent mainland, its occurrence probably depends on migration from other regions of Australia. Some summer breeding on the nearby mainland may be possible in a few places where introduced perenial plants in the Urticaceae are established (see Powell 1997). More observations of *Z. l. labradus* would be needed in order to suggest what its status on the Abrolhos might be.

Nearly all the species recorded here also occur on other islands off the west coast of Western Australia. We have found *B. j. teutonia* on South Muiron I., 17 km north-east of North-West Cape (Williams *et al.* 1996). It is also known from Bernier I. (Dunn and Dunn 1991) and Dorre I. (Williams *et al.* 1998). *T. a. argenteoornatus*, *D. c. petilia*, *V. kershawi*, *V. itea*, *J. v. calybe*, *T. s. serpentata* and *Z. l. labradus* are recorded from one or more of Garden, Rottnest, Bernier and Dorre Is (Williams 1997, Williams *et al.* 1998). Only *N. a. occidens* has not previously been recorded from any other west-coast island.

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References

COMMON, I.F.B. and WATERHOUSE, D.F. 1981. *Butterflies of Australia.* Angus and Robertson, Sydney; pp xiv + 682.

DUNN, K.L. and DUNN, L.E. 1991. *Review of Australian butterflies: distribution, life history and taxonomy.* Privately published, Melbourne; pp 1-660.

GIBBS, G.W. 1980. *New Zealand butterflies: Identification and natural history.* Collins, Auckland; 207 pp..

GREEN, J.W. 1985. *Census of the vascular plants of Western Australia.* Western Australian Herbarium, Department of Agriculture, Perth; pp 1-312.

MONTEITH, G.B. and YEATES, D.K. 1988. The butterflies of Mount Moffatt and Carnarvon National Parks. *Queensland Naturalist* **28:** 14-22.

POWELL, R.J. 1993. The use of two species of *Parietaria* (Urticaceae) as foodplants by the butterfly *Vanessa itea* (Fabricius) in south-western Australia. *Australian Entomologist* **20:** 57-58.

POWELL, R.J. 1997. Garden observations on the Australian Admiral Butterfly. *Victorian Entomologist* **27:** 88-99.

STORR, G.M. 1965. The physiography, vegetation and vertebrate fauna of the Wallabi group, Houtman Abrolhos. *Journal of the Royal Society of Western Australia* **48:** 1-14.

STORR, G.M., JOHNSTONE, R.E. and GRIFFIN, P. 1986. Birds of the Houtman Abrolhos, Western Australia. *Records of the Western Australian Museum, Supplement* **24:** 1-42.

WILLIAMS, A.A.E., WILLIAMS, M.R., TOMLINSON, A.G. and LUNDSTROM, T.D. 1996. Records of butterflies from the central desert region and semi-arid areas of Western Australia. *Victorian Entomologist* **26:** 29-34.

WILLIAMS, A.A.E. 1997. The butterflies (Lepidoptera) of Garden and Rottnest islands, Western Australia. *Australian Entomologist* **24:** 27-34.

WILLIAMS, A.A.E., SCANLON, M.D. and HIMBECK, K.J. 1998. New records of butterflies (Lepidoptera) from Dorre Island, Western Australia. *Victorian Entomologist* **28:** 55-58.

THYSANOPTERA FROM LORD HOWE ISLAND

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Abstract

Only one species of thrips was previously recorded from Lord Howe Island, but notes on a further 33 species in 26 genera are given here. Most are introduced, either tropical tramps or from mainland Australia, but a few are endemics with some indication of faunal relationships with New Zealand and New Caledonia.

Introduction

Lord Howe Island (LHI) lies off the Pacific coast of Australia, about 700 km north-east of Sydney. Shaped like an irregular crescent, it is scarcely 11 km long with a maximum width of 2.8 km. Despite its small size, it is topographically diverse with two large mountains at one end, Mt Lidgbird (770 m) and Mt Gower (880 m), and a series of lower hills at the other (Hutton 1986). Although it lies well outside the tropics, it supports the southernmost coral reef in the world and a diverse terrestrial flora of more than 450 vascular plant species. Of these plants, at least 250 are recently introduced and a little over 100 are endemics (Green 1994). There is no evidence of human occupation before the visit in 1788 of HMS *Supply* from the First Fleet, on its way from Sydney to Norfolk Island, but the island now supports a population of about 300 people together with a similar number of tourist visitors. Politically it is part of New South Wales, although it is protected as a World Heritage area and much of the land surface remains covered by natural forest.

The flora and vertebrate fauna of LHI are both well documented, but the invertebrate fauna remains poorly studied. A few insect species are evidently endemic, such as three species of peloridiid Hemiptera, but Smithers, in Recher and Ponder (1981), indicated that there is no consolidated list of the insects recorded from LHI and stated that preparation of such a list would be a "progressive step". The only record of Thysanoptera from the Island is the description of *Bolothrips australiensis* Moulton, referred to below under Idolothripinae, although there have been unconfirmed verbal reports of thrips damage to *Howea* palms in the nursery that is the main source of these domestic palms. The objective of this report is to detail the 33 species in 25 genera of Thysanoptera, representing three families, that were taken during a 6-day holiday on LHI in late November 1996. All of the material is slide-mounted and available at the Australian National Insect Collection, Canberra. Full nomenclatural data on the taxa listed here are available in Mound (1996) and Mound and Walker (1986).

Aeolothripidae

The 36 species and 12 genera of this family known from Australia have been revised recently by Mound and Marullo (1998).

Desmothrips reedi Mound. Described originally from New South Wales, this species is widespread in southern Australia between Sydney and Perth. A large population, including both sexes and larvae, was found on LHI, living at the base of the dense stand of kikuyu grass (*Pennisetum clandestinum*) that extends along the foreshore facing Lagoon Beach beneath Mt Gower. This thrips was associated with large numbers of a mite of the genus *Eupodes* (family Eupodidae, order Prostigmata: det. Anne Baker) on which it presumably was feeding. The thrips is a strongly bicoloured ant-mimic, with the first abdominal tergite bearing numerous transverse sculptured striae and with most individuals wingless.

Thripidae

The two subfamilies recognised in this family are both represented on LHI. Most of the thripid taxa listed here are also recorded from Australia and may be identified with the keys in Mound and Gillespie (1997).

Panchaetothripinae

Helionothrips spinosus Wilson. Described from New South Wales, where it can be quite common near the coast, this large dark species was found near Settlement Beach and at Soldier's Creek. It breeds on leaves of the scrambling vine *Smilax australis* (Smilacaceae). The males have a tapering abdomen with a pair of very stout spines dorsally near the apex that are probably used in some form of competitive behaviour.

Heliothrips haemorroidalis (Bouché). This, the greenhouse thrips, is known worldwide as a pest on many different plants. On LHI it was found causing damage to leaves of *Howea* palms that were in poor health. It is a highly distinctive species, with a brown body and yellow legs when mature and with the body surface strongly reticulate.

Hercinothrips bicinctus (Bagnall). Widespread around the world as a minor pest of bananas and frequently common in eastern Australia, this species was taken at Soldier's Creek on leaves of the native plants *Marsdenia rostrata* (Asclepiadaceae) and *Alyxia ruscifolia* (Apocynaceae). The body surface is strongly reticulate but the forewings are bicoloured, brown and white.

Thripinae

Anaphothrips obscurus (Müller). This worldwide pest of wheat and other cereal crops was found in low numbers on kikuyu grass along the foreshore. The male remains unknown but females are either macropterous or micropterous, with the body yellow, and are unusual in having an oblique suture across the sixth antennal segment, giving the antenna the appearance of being 9-segmented.

Anaphothrips sudanensis Trybom. Another worldwide pest of cereal and sugar cane crops, both sexes of this species are strongly bicoloured. It was found on LHI along the foreshore on kikuyu grass.

Aptinothrips rufus Haliday. Found on grasses in temperate areas throughout the world, this wingless species with the terminal (sixth) antennal segment greatly enlarged was found on pasture grasses near Settlement Beach.

Bolacothrips pulcher (Girault). This genus of about 10 grass-living species of thrips is found throughout the Old World tropics and sub-tropics. On LHI, males and females of the Australian species, *B. pulcher*, were found on kikuyu grass at Settlement Beach and at Old Gulch. Both sexes are yellow with the apex of the abdomen dark brown and the forewings banded. Samples from Darwin, from north-east Queensland and from Canberra show slight differences in the colour of the antennae and the front of the head. Despite this, they are all considered here to represent a single species.

Dendrothrips sp. Although this genus is widespread across the Old World, in the Australasian region there is a single described species, from New Caledonia, with a second but undescribed species widespread in eastern Australia. A third species was found on LHI, apparently associated with leaves of *Smilax australis*.

Ensiferothrips sp. Only one species is described in this genus, from New Caledonia and eastern Australia. A second species was found on LHI in association with leaves of *Smilax australis*.

Hydatothrips sp. One specimen representing this genus was take on LHI. The genus is represented in Australia by several species, all of which are currently poorly defined, being known only from fragmentary material.

Pseudanaphothrips achaetus Bagnall. Known throughout Australia and also from New Zealand, this polyphagous flower-living thrips was found on LHI only in the flowers of a small population of *Sesuvium portulacastrum* (Aizoaceae) at Ned's Beach.

Pseudodendrothrips sp. Only one named species of this genus is recorded from Australia, although at least two further species have been collected and are in the ANIC at Canberra. A further species, with strongly banded forewings, was taken on LHI, from leaves of *Alyxia ruscifolia* and *Smilax australis*. Relationships between the tiny thrips in this genus and also *Ensiferothrips* and *Dendrothrips*, all of which are presumed to be associated with the leaves of forest trees and are thus rarely collected, are the subject of continuing study.

Scirtothrips albomaculatus Bianchi. Like other *Scirtothrips*, this species breeds on young terminal leaves but the available records suggest that *S. albomaculatus* is opportunistic in its host plant and habitat associations. Based originally on a single female from New Caledonia, it has been taken at various localities in eastern Australia, including Mundubbera (Qld) on citrus, Brisbane (Qld) and Wiseman's Ferry (NSW) on mangrove leaves, and at the edge of the Simpson Desert (SA) on *Acacia cambagei* phyllodes. The

species is well established on LHI, where it was found in large numbers at several sites on leaves of *Dodonaea viscosa* (Sapindaceae).

Thrips imaginis Bagnall. The plague thrips of Australia was found only in low numbers on LHI but it was collected from the flowers of several plants, including *Lagunaria pattersoni* (Malvaceae), *Olea europea* (Oleaceae) and *Melaleuca* sp. (Myrtaceae).

Thrips tabaci Lindemann. Only a few specimens of this worldwide pest species were taken, all from flowers of cultivated *Agapanthus* (Liliaceae).

Phlaeothripidae

Two subfamilies are recognised in this family and representatives of both of these were found on LHI.

Idolothripinae

All species in this subfamily feed by ingesting whole fungal spores and they live in leaf litter, at the bases of grass tussocks, or on dead branches and dead leaves. *Bolothrips australiensis* Moulton was actually described from LHI, based on a single micropterous female. However, in providing keys to the 77 species in 24 genera of Idolothripinae known from Australia, Mound (1974) placed *B. australiensis* as a synonym of the common tropical tramp thrips, *Nesothrips lativentris* (Karny), a species that can be found on dead branches in coastal Queensland.

Carientothrips semirufus (Girault). Described originally from Melton, now a western suburb of Melbourne, and subsequently recorded from several sites in south-eastern New South Wales, this apterous species lives at the base of tussocks of grasses. It is strongly bicoloured, with the abdomen dark and the head and thorax yellow, but has the head considerably longer than wide, in contrast to *N. propinquus* (see below) which is found in similar habitats. Five specimens were taken on LHI, at the base of grasses along the path of Smoking Tree Ridge. These differ from the typical form of the species from south-eastern Australia in having the major setae on the ninth tergite finely acute and as long as the abdominal tube, instead of shorter than the tube and with capitate apices. Specimens identical with the LHI form have also been taken from grasses at Cape Tribulation, north of Cairns (Qld). This material represents either a further undescribed species or, judging from other material from further south in Queensland, a northern form in a cline along the eastern coast of Australia.

Nesothrips propinquus (Bagnall). This species is widespread along the old sailing ship route between New Zealand, Australia and Europe, presumably having been distributed in dry grass and hay. It lives at the base of tussocks of grass and is particularly varied in colour and structure in New Zealand, where it is considered to have originated (Mound and Walker 1986). Most of the specimens taken on LHI (all apterae) were of the "typical form", with the

abdomen black but the head, basal antennal segments, thorax, and legs yellow, although some individuals had the anterior part of the body brownish. Abdominal tergites II and III are foreshortened and the sternites of these segments lengthened; this is presumably related to the habit of the adults of holding the abdomen over the head when disturbed. This behaviour has the startling and confusing result of suddenly transmuting these elongate thrips into spherical 'mites'.

Phlaeothripinae

Members of this large subfamily have a wide range of biologies including leaf- and flower-feeding, but about half of the species feed only on fungal hyphae. No single set of identification keys is available to the 200 species and 75 genera currently recorded from Australia, although Mound (1996) lists references to several groups within this subfamily.

Baenothrips moundi (Stannard). This wingless, fungus-feeding species with the tenth abdominal segment exceptionally elongate is widespread in Australia and New Zealand and lives at the base of grass tussocks. Females were taken on LHI at various sites, usually in association with kikuyu grass.

Baenothrips sp. Two wingless females taken from dead twigs at Soldier's Creek apparently represent an undescribed species. They have the dorsal pair of anal setae on the tube about one fifth as long as the other two pairs of anal setae, whereas these dorsal setae are about half as long as the other pairs in *B. moundi*, and effectively absent in the only other known Australian member of this genus, *B. caenosus* (Stannard). The metepimeral setae are minute as in *B. caenosus* but the anterolateral setae on the head are elongate.

Deplorothrips spp. This genus was erected for a single New Zealand species, *D. bassus*, which exhibits remarkable variation in structure between populations (Mound and Walker 1986). Subsequently, Okajima (1989) described six further species from several south-east Asian countries. On LHI, a series of wingless individuals, representing both sexes of one species, was taken from dead twigs and branches at Soldier's Creek. This species is closely similar to *D. bassus* but the pronotal posteroangular pair of setae have capitate, not pointed, apices. A solitary wingless male of a second species of this genus was taken along with the first species, but this has the hind tibiae and also the third antennal segment brown, not yellow.

Haplothrips angustus Hood. Widespread in Australia on grasses and sedges, females and males were taken together with larvae on a species of *Scirpus* growing along the margins of the lower reaches of Soldier's Creek.

Haplothrips sp. An unusual micropterous member of this genus, with the wings smaller than the width of the mesothoracic spiracular area and the ocelli not developed, was found commonly on leaves of various shrubs. The males have the fore legs and pronotum more strongly developed than the females, with a large fore tarsal tooth, suggesting that there is some form of

competition involved in the breeding behaviour. *Haplothrips* includes about 250 species worldwide, all of which are fully winged. This species is presumably undescribed and is a likely candidate as an endemic LHI species but requires considerable further study.

Hoplandrothrips sp. More than 80 species are currently listed in this genus worldwide, most of which feed on fungal hyphae on dead wood and often exhibit considerable sexual dimorphism. A macropterous male and female taken from the branches of a dead fallen tree at Lagoon Beach on LHI cannot at present be identified to species, although certainly they do not represent any species currently known from Australia. The female has enlarged, asymmetric, almost feather-like setae laterally on the tergites, although these are not so strongly developed in the male.

Hoplothrips orientalis (Ananthakrishnan). Described originally from southern India, this species has been recorded from several sites in New Zealand (Mound and Walker 1986). One series that included larvae together with micropterous adults of both sexes and one macropterous male was taken from old dead branches at Soldier's Creek on LHI. These specimens have dark antennal segments similar to those of the New Zealand samples, but in contrast to the specimens reported from that country the only major male found did not have a tubercle ventrally on the head.

Karnyothrips melaleucus (Bagnall). Apparently a predator of scale insects, this species has been found in many places throughout the tropics including the coast of Queensland. A single female was taken from kikuyu grass near Settlement Beach.

Karnyothrips sp. Three macropterous females of a haplothripine species with bright yellow hind tibiae were taken each at a different site on LHI. This species has a very small fore tarsal tooth but it remains unidentified, although it is probably referrable to the genus *Karnyothrips*.

Macrophthalmothrips argus (Karny). Described originally from Queensland, and subsequently described under three different names from Queensland, Hawaii and Tanzania, one female and three males together with larvae were taken on LHI from the dead branches of a fallen tree just behind Lagoon Beach. The species is a member of the fungal hyphae feeding cohort of thrips taxa that can be found commonly on dead twigs and branches particularly in tropical countries (Mound and Marullo 1996). As in so many other thrips species in this habitat, the males have enlarged fore legs with stout tubercles, indicating that the breeding behaviour involves some form of male/male competition or fighting.

Psalidothrips spp. One species of this genus was found in good numbers on LHI, at the base of native grasses at several sites along the valley from Soldier's Creek to Smoking Tree Ridge. This is a member of a complex of species found throughout Australia living in leaf litter, most of which remain

unstudied and undescribed. Specimens apparently identical to the LHI specimens have been studied both from eastern Australia and from New Zealand. The species is closely similar in colour and structure to *P. moeone* Mound & Walker from New Zealand, but has two equally large sense cones on the third antennal segment instead of only one. A single male of a second species of this genus was collected at the same site on LHI as the first species. However, this is one of the members of the genus that has three sense cones on the third antennal segment.

Stephanothrips barretti Mound. Described from a single female from near Brisbane (Qld), one female of this species was taken on LHI in Erskine Valley. Members of this genus are fungus feeders and are usually found in leaf litter, at the base of grasses, or on dead twigs.

Strepterothrips tuberculatus (Girault). Widespread in eastern Australia, this species is also known from New Zealand (Mound and Walker 1986). It is a fungus-feeding species that lives on dead, often rather dry, twigs. Two apterous females were taken on LHI at Soldier's Creek.

Faunal relationships

A total of 34 Thysanoptera species, in 26 genera, is now recorded from Lord Howe Island. Of these, almost 30% are tramp species, having been found in many countries around the world. Species found during this visit that are worldwide pests were *Aptinothrips rufus*, *Anaphothrips obscurus*, *Anaphothrips sudanensis*, *Hercinothrips bicinctus*, *Heliothrips haemorroidalis* and *Thrips tabaci*. Curiously no *Frankliniella* species were taken. Similarly widespread around the world are the fungus-feeding species *Nesothrips lativentris*, *Macrophthalmothrips argus* and *Hoplothrips orientalis*, and the predatory species *Karnyothrips melaleucus*. This intrusion of exotic species has implications for the Island as a nature conservation area. In terms of trading patterns, the Island is effectively an eastern suburb of Sydney and the resultant absence of quarantine restrictions sits uncomfortably with its World Heritage status, because it ensures the ready importation of foreign species. In this connection, it was noted that the scale insect, *Ceroplastes destructor*, which has recently become established on LHI, is evidently spreading through the native forests, resulting in blackened leaves where sooty moulds are growing on the honeydew excreted by these insects.

In contrast to many insect species, introduced thrips in mainland Australia commonly do not invade areas of native vegetation and this pattern was evident on LHI. Most of the tramp species listed above were not found within the native forest but were associated with kikuyu grass or garden plants. The contrast between the thrips found on native grasses along the forest paths and the thrips found on kikuyu grass a few metres away outside the forest, was striking.

A second major element in the thrips fauna of LHI is the 30% of species that are shared with mainland Australia. These include flower thrips *Pseudanaphothrips achaetus* and *Thrips imaginis*, the leaf-feeders *Helionothrips spinosus* and *Scirtothrips albomaculatus*, grass thrips *Bolacothrips pulcher* and *Haplothrips angustus*, and fungus feeders *Carientothrips semirufus*, *Baenothrips moundi*, *Stephanothrips barretti* and *Strepterothrips tuberculatus*. A third element in the fauna suggests relationships with New Zealand, particularly the undescribed species of *Deplorothrips* and *Psalidothrips*. However, these could be introductions due to human trading, as with other species that are shared between Australia, LHI and New Zealand.

Finally, some of the unidentified species listed above are probably endemics, particularly the leaf-feeding species of *Dendrothrips*, *Pseudodendrothrips* and *Ensiferothrips*, because members of these genera usually have localised distributions. Also, the micropterous *Haplothrips* species discussed above is possibly an endemic. However, it would be unwise to describe new species on this material without a more extensive study of their relationships, particularly considering the inadequate sampling of the thrips fauna of the east coast of Australia (see Mound 1996).

References

GREEN, P.S. 1994. Norfolk Island and Lord Howe Island; pp 1-26 in *Flora of Australia* **49**, Oceanic Islands 1.

HUTTON, I. 1986. *Discovering Australia's World Heritage. Lord Howe Island.* Conservation Press, ACT, 157 pp.

MOUND, L.A. 1996. Thysanoptera; pp 249-336, 397-414 (index) *in* Wells, A., *Zoological Catalogue of Australia.* Volume 26. Psocoptera, Phthiraptera, Thysanoptera. CSIRO, Melbourne.

MOUND, L.A. and GILLESPIE, P.S. 1997. *Identification Guide to Thrips Associated with Crops in Australia.* NSW Agriculture, Orange, 56 pp.

MOUND, L.A. and MARULLO, R. 1998. The biology and identification of the Aeolothripidae (Thysanoptera) in Australia. *Invertebrate Taxonomy*, in press.

MOUND, L.A. and WALKER, A.K. 1986. Tubulifera (Insecta: Thysanoptera). *Fauna of New Zealand* **10**: 1-140.

OKAJIMA, S. 1989. The genus *Deplorothrips* Mound et Walker (Thysanoptera, Phlaeothripidae) from Eastern Asia, with descriptions of six new species. *Japanese Journal of Entomology* **57**: 241-256.

RECHER, H.F. and PONDER, W.F. (eds) 1981. *Lord Howe Island. A summary of current and projected scientific and environmental activities.* The Australian Museum, Sydney, 72 pp; unpublished report.

THE LIFE HISTORY OF *HYPOCHRYSOPS POLYCLETUS ROVENA* DRUCE (LEPIDOPTERA: LYCAENIDAE)

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Abstract

The life history of *Hypochrysops polycletus rovena* Druce in northern Queensland, Australia is recorded and illustrated. The larval food plant is *Rhyssopterys timorensis* (Blume) Juss. (Malpighiaceae).

Introduction

Hypochrysops polycletus rovena Druce is known in Australia from northern Cape York Peninsula to Sarina (Common and Waterhouse 1981; Sands 1986). Elsewhere *H. polycletus* (Linnaeus) occurs from the Moluccas eastwards through mainland Irian Jaya and Papua New Guinea to New Ireland and a record from Torres Strait, Queensland (Sands 1986). Apart from an observation of females ovipositing on *Rhyssopterys timorensis* in Papua New Guinea (Sands 1986), nothing has been known of the life history of the species.

During a search of *R. timorensis* vines on central Cape York Peninsula for the immature stages of *Allora doleschallii* (Felder) (Hesperiidae) in 1990, we found the immature stages of *H. p. rovena* on many of the same plants. Subsequently we have found the immature stages from several locations in northern Queensland.

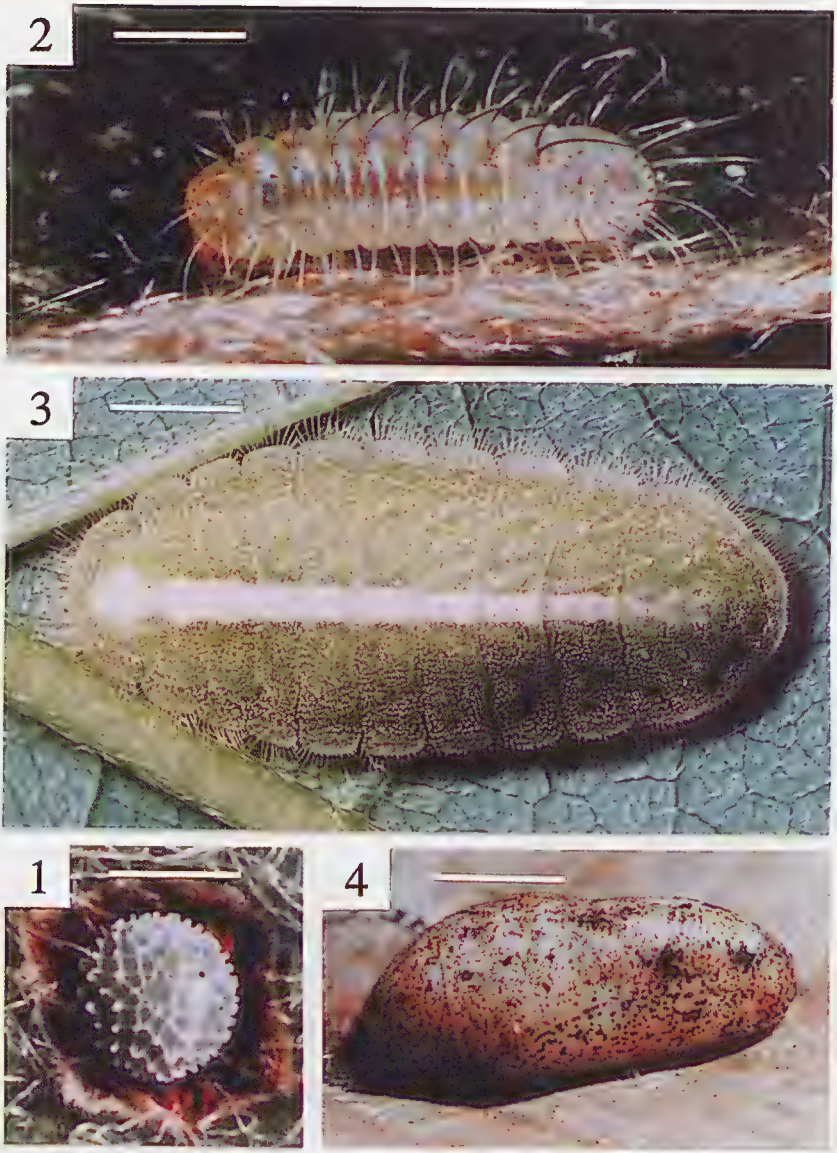
Life History

Food plant. *Rhyssopterys timorensis* (Blume) Juss. (Malpighiaceae).

Egg (Fig. 1). Blue-green; dome-shaped with very fine ridges forming irregular, mostly 4-sided pits, raised at their intersection to knobs with blunt roughened tips; diameter 0.6 mm.

First instar larva (Fig. 2). Pale green, white dorsally; flattened, 1 pair of short pale and 1 pair of long black dorsal hairs on most segments; long marginal hairs, mostly white but some black at posterior end; head pale greenish brown; prothoracic plate pale green; anal plate grey.

Second to final instar larvae (Fig. 3). Green, becoming pale pinkish prior to pupation, white middorsal line and obscure white oblique dorsolateral lines; flattened at sides with white marginal hairs and dense pale and dark secondary setae; head pale brown; prothoracic plate diamond shaped, green with white markings; anal plate green with white markings. Newcomer's and tentacular organs present.



Figs 1-4. *Hypochrysops polycletus rovena*: (1) egg; (2) first instar larva, head at left; (3) final instar larva, head at left; (4) pupa. Scale bars (1, 2) = 0.5 mm, (3, 4) = 3 mm.

Pupa (Fig. 4). Pale brown speckled with dark brown, a median dark brown patch at front of head, dark brown patches laterally and dorsolaterally on thorax and abdomen; attached by anal hooks and central girdle. Length 11-13 mm.

Discussion

Eggs, which are unusually small for the size of the adult, are laid singly beneath leaves, often in scar tissue or on stems or flower buds. Early instar larvae shelter beneath juvenile leaves and eat small patches from the epidermis. Larger larvae often shelter on stems or leaf petioles and commonly feed on growing tips, stems of fresh shoots and on petioles of leaves, which causes younger leaves to wilt and die. Smaller vines are often denuded of fresh foliage by larger larvae and remaining small larvae are often unable to achieve full size and emerge as small adults. A larva which had access to only mature leaves in captivity appeared to imbibe fluid from the leaf nectaries. Pupation occurs in curled dead leaves caught within the vine stems or at the base of the plant. In summer, the life cycle may be completed in 5-6 weeks.

We found immature stages in most months of the year on plants that continued to produce new growth. In vine thicket areas where *R. timorensis* is a common element of the flora, most vines are deciduous during the dry season and unable to support larvae of *H. polycletus*, but occasional larger vines produce fresh foliage throughout the year and maintain a reduced population of *H. polycletus*. During the wet season the vines produce copious foliage and the population of *H. polycletus* expands to exploit the available food resource. From April to June adults may be locally common in vine thicket areas in central Cape York Peninsula.

In most areas the larvae are not attended by ants but at McCleod Creek, north of Cooktown, larvae are attended by *Camponotus* sp. and on Cape York Peninsula larvae are occasionally attended by small unidentified black ants. Ant attendance appears to be facultative and restricted to the same few vines in each area. We have not found the immature stages of *H. polycletus* on plants infested with green tree ants *Oecophylla smaragdina* (Formicidae).

References

COMMON, I.F.B. and WATERHOUSE, D.F. 1981. *Butterflies of Australia*. Angus and Robertson, Sydney; xiv + 682 pp.

SANDS, D.P.A. 1986. A revision of the Genus *Hypochrysops* C. & R. Felder (Lepidoptera: Lycaenidae). *Entomonograph* **7**: 1-116.

AN ACCUMULATIVE BIBLIOGRAPHY OF AUSTRALIAN ENTOMOLOGY

Compiled by G. Daniels

DANIELS, G.

1998 Orthorrhaphous Diptera from Lawn Hill National Park and Musselbrook Reserve, Queensland. Pp. 87-88 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

DANIELS, G. and EDWARDS, E.D.

1998 Butterflies from Lawn Hill National Park and Musselbrook Reserve, Queensland. Pp. 89-91 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

DISNEY, R.H.L.

1992 A new species and new records of Phoridae (Diptera) from New Zealand. *G. ital. Ent.* **6:** 119-124

DISNEY, R.H.L. and BARTAREAU, T.

1995 A new species of *Dohrniphora* (Diptera: Phoridae) associated with a stingless bee (Hymenoptera: Apidae) in Australia. *Sociobiology* **26:** 229-240.

DOLLIN, A.E., DOLLIN, L.J. and SAKAGAMI, S.F.

1997 Australian stingless bees of the genus *Trigona* (Hymenoptera: Apidae). *Invert. Taxon.* **11:** 861-896.

DOWTON, M., AUSTIN, A.D., and ANTOLIN, M.F.

1998 Evolutionary relationships among the Braconidae (Hymenoptera: Ichneumonoidea) inferred from partial 16S rDNA gene sequences. *Insect molecul. Biol.* **7:** 129-150.

DYCE, A.L. and WIRTH, W.W.

1997 The *purus* group, a newly recognised natural species-group in the genus *Culicoides* (Diptera: Ceratopogonidae), including species from Australia, New Guinea and Sulawesi. *Invert. Taxon.* **11:** 575-598.

EDWARDS, E.D.

1998 Moths (Lepidoptera) of the Musselbrook area. Pp. 125-134 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

EWART, A.

1998 Cicadas of Musselbrook Reserve. Pp. 135-138 *in* Comben, L., Long, S. and Berg, K. (eds.), *Musselbrook Reserve Scientific Study Report*. Royal Geographical Society of Queensland: Brisbane.

1998 Cicadas, and their songs, of the Miles-Chinchilla region. *Qd Nat.* **36:** 54-72.

EXLEY, E.M.

1998 New *Euryglossa* (*Euhesma*) bees (Hymenoptera: Colletidae: Euryglossinae) associated with the Australian plant genus *Eremophila* (Myoporaceae). *Rec. West. Aust. Mus.* **18:** 419-437.

FIELD, S.A. and KELLER, M.A.

1993 Alternative mating tactics and female mimicry as post-copulatory mate-guarding behaviour in the parasitic wasp *Cotesia rubecula*. *Anim. Behav.* **46:** 1183-1189.

FISCHER, M.

1997 Redeskription von *Opius* (*Gastrosema*) *waterloti* Granger und *Opius* (*Gastrosema*) *hedqvisti* Fischer sowie Bestimmungsschlussel fur die Arten der Untergattung *Gastrosema* Fischer der athiopischen, orientalischen und australischen Region (Hymenoptera, Braconidae, Opiinae, *Opius* Wesmael). *Z. ArbGem. öst. Ent.* **49:** 121-127.

FLOATER, G.J.

1998 Tuft scales and egg protection in *Ochrogaster lunifer* Herrich-Schäffer (Lepidoptera: Thaumetopoeidae). *Aust. J. Ent.* **37:** 34-39.

GREENSLADE, P.J.M. and DEHARVENG, L.

1997 Revision of *Friesea* species (Collembola: Neanuridae) of Australia and offshore islands, with biogeographical notes and key to species. *Invert. Taxon.* **11:** 321-331.

GULLAN, P.J. and BROOKES, H.M.

1998 Giant females and bird-of-paradise flies: notes on the biology of *Callipappus* Guérin-Méneville (Hemiptera: Margarodidae). *Aust. J. Ent.* **37:** 2-7.

GULLAN, P.J. and STRONG, K.L.

1997 Scale insects under eucalypt bark: a revision of the Australian genus *Phacelococcus* Miller (Hemiptera: Coccoidea: Eriococcidae). *Aust. J. Ent.* **36:** 229-240.

HARDWICK, T.A., COOPER, P.D., CRANSTON, P.S., HUMPHREY, C.L. and DOSTINE, P.L.

1995 Spatial and temporal distribution patterns of drifting pupal exuviae of Chironomidae (Diptera) in streams of tropical northern Australia. *Freshwat. Biol.* **34:** 569-578.

HOFFMANN, B.D.

1998 Thermophilia in a tropical Australian ant of the *Melophorus aeneovirens* (Lowne) species-group (Hymenoptera: Formicidae). *Aust. J. Ent.* **37:** 162-167.

HORAK, M.

1997 The phycitine genera *Faveria* Walker, *Morosaphycita*, gen. n., *Epicrocis* Zeller, *Ptyobathra* Turner and *Vinicia* Ragonot in Australia (Pyralidae: Phycitinae). *Invert. Taxon.* **11:** 333-421.

HUDDLESTON, T. and WALKER, A.K.

1994 A revision of the *Chelonus scrobiculatus* species-group of Cheloninae (Insecta: Hymenoptera: Braconidae). *Annln naturh. Mus. Wien* (B) **96:** 153-168.

JENNINGS, J.T. and AUSTIN, A.D.

1997 Revision of *Aulacofoenus* Kieffer (Hymenoptera: Gasteruptiidae), hyptiogastrine wasps with a restricted Gondwanic distribution. *Invert. Taxon.* **11:** 943-976.

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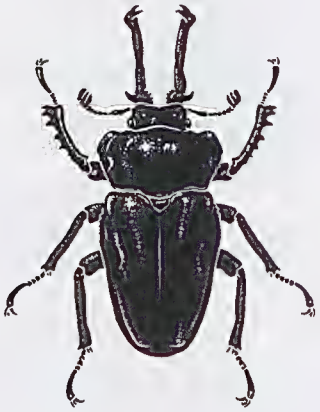

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